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10/657,188	09/09/2003	Joseph E. Legare	Legare-PAUS0004	1617

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EXAMINER	
NGUYEN, TU MINH	
ART UNIT	PAPER NUMBER
3748	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/657,188	LEGARE, JOSEPH E.	
	Examiner	Art Unit	
	TU M. NGUYEN	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 January 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) *14,15 and 17-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13,16 and 21-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. An Applicant's Amendment filed on January 25, 2008 has been entered. Claims 1, 4-7, 11-14, 16-19, 23, and 24 have been amended. Overall, claims 1-24 are pending in this application.

Applicant's argument that Akazaki et al. fail to disclose or teach the use of a switching oxygen sensor, is persuasive; therefore, a new non-final rejection is set forth below.

2. Based on a previous applicant's election with traverse of the invention of Group I in the reply filed on June 15, 2007, claims 1-13, 16, and 21-24 are readable thereon will be examined in its full merit. Claims 14, 15, and 17-20 are withdrawn from further consideration by the examiner as being drawn to a non-elected invention.

The traversal is on the ground(s) that the subject matter of all pending claims is sufficiently related that a thorough search for the subject matter of any one group of claims would necessarily encompass a search for the subject matter of the remaining claims. Thus, it is submitted that a search and examination of the entire application could be performed without serious burden. This is not found persuasive because the three groups of claimed invention are clearly not related in terms of their structures and/or modes of operation. For example, in the elected Group I, the function is to adjust an engine operating parameter such as a fuel injection amount for each individual cylinder based on a synchronizing signal provided by an exhaust gas sensor during a transient load change. In Group II, the function is to adjust an engine operating parameter such as a fuel injection amount for each individual cylinder during a transient load

change. And in Group III, the function is to judge an operating condition of a catalytic converter. The clear unrelated features among the groups of claimed invention would require a separate search area for each group and thus, impose a burden in search and examination.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-8, 10-13, 16, and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akazaki et al. (U.S. Patent 5,566,071) in view of Zimlich et al. (U.S. Patent 5,385,016).

Re claims 1, 3, 4, 6, 7, 12, 13, 16, 21, 23, and 24, as shown in Figures 1 and 14, Akazaki et al. disclose a method of individual engine cylinder closed loop fuel control, including flue steps of:

- providing a catalyst (26) for reducing exhaust gas emissions;

- detecting exhaust gases' rich or lean conditions with a wide-range oxygen sensor (40);

- synchronizing (step S112) a sampling time period for detecting a change in an oxygen sensor's output condition to an individually selected cylinder's exhaust gases entering the exhaust manifold;

- detecting (step S110) at least one engine parameter (engine speed or manifold absolute pressure) sufficient to determine stable engine operational conditions;

- controlling a closed loop fuel control change in the fuel quantity during a first period to all cylinders connected to an exhaust manifold with a common oxygen sensor by using the minimum said quantity to cause sensor cycling between rich and lean conditions (see at least the Abstract and Figure 8);

- sampling the oxygen sensor's condition during a second time period, when each individual cylinder's gases are entering said exhaust manifold and identifying cylinders resulting in a contrary sensor condition to the respective said closed loop fuel control changes during the first period (see at least lines 27-45 of column 8);

- controlling (step S114) a minimum change in fuel quantity into at least one of the selected individual cylinders with said contrary sensor conditions, using said fuel quantity sufficient to produce a change in the oxygen sensor condition, thus differing from the selected individual cylinder's exhaust gases' conditions sampled in the second time period, during a third time period;

- determining (step S114) the minimum change in fuel quantity causing a change in the oxygen sensor condition for each selected individual cylinder having said contrary sensor conditions follow the third time period and storing in memory such minimums for each respective individual cylinder during stoichiometric conditions;

- establishing (steps S116 and s118) a learned average fuel quantity offset for each individual cylinder by adjusting all cylinders' offsets such that the minimum said fuel control change necessary for each selected engine operational condition are stored in memory.

Akazaki et al., however, fail to disclose that instead of a wide-range oxygen sensor, the exhaust gases' conditions are detected with a switching-type oxygen sensor.

As shown in Figure 1, Zimlich et al. disclose an air-fuel control system responsive to duo upstream EGO sensors, comprising a V-shaped engine (28) and a single catalytic converter (50). As indicated on line 56 of column 2 to line 2 of column 3, Zimlich et al. teach that it is conventional in the art to utilize a switching type oxygen sensor (44 or 54) to detect exhaust gases' conditions and employs the signals from the sensor to control an engine air-fuel ratio to achieve high purification efficiency at the catalytic converter. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the switching type oxygen sensor taught by Zimlich et al. in the method of Akazaki et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to effectively control an engine air-fuel ratio for optimum purification efficiency of a catalyst.

Re claims 2 and 25, the modified method of Akazaki et al. further comprises the step of determining an oxygen sensor time response characteristics for assessing proper operating condition of the oxygen sensor using the time delay period stored in memory (see Figure 3 at least line 30 of column 4 to line 51 of column 6).

Re claims 5 and 11, as taught by Zimlich et al., the oxygen sensor detecting exhaust gases' conditions in the modified method of Akazaki et al. is a switching type sensor having two discrete output voltage characteristics for conditions richer and leaner than stoichiometric.

Re claim 8, in the modified method of Akazaki et al., the change in fuel quantity is implemented gradually by transitioning to the maximum controlled fuel quantity changes amongst individual cylinders spanning over a number of cylinder firing events in order to

minimize perceived changes in engine smoothness caused by step changes in engine cylinders' torque levels.

Re claim 10, in the modified method of Akazaki et al., the changes in fuel quantity are determined using stored correction values based upon oxygen sensor feedback during prior engine load changes of similar characteristics, such said feedback from subsequent prior combustion events having said fuel quantity causing said cycling of gases' air-fuel about a defined control point.

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akazaki et al. in view of Zimlich et al. as applied to claim 7 above, and further in view of Maki et al. (U.S. Patent 5,758,490).

The modified method of Akazaki et al. discloses the invention as cited above, however, fails to disclose that the causing cycling of gases' air-fuel about a defined control point is used to determine dynamic catalyst oxygen storage characteristics during non-stoichiometric conditions for modifying subsequent fuel changes into the individual cylinders for more quickly reaching the defined control point.

As shown in Figure 1, Maki et al. disclose a fuel metering control system for a 4-cylinder internal combustion engine, comprising a catalyst (28), an upstream LAF sensor (54), and a downstream oxygen sensor (56). As depicted in Figure 8 and indicated on line 55 of column 7 to line 36 of column 8, Maki et al. teach that it is conventional in the art to estimate the air-fuel ratios at the individual cylinders from the outputs of the upstream LAF sensor and utilize a closed loop air-fuel ratio control with feedback from the downstream oxygen sensor for dynamic catalyst oxygen storage characteristics during lean and rich engine conditions in order to quickly

reach a defined control point and to maximize purification efficiency of tile catalyst. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Maki et al. in the modified method of Akazaki et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to effectively control an engine air-fuel ratio for optimum purification efficiency of a catalyst.

Response to Arguments

6. Applicant's arguments with respect to the references applied in the previous Office Action have been considered but are moot in view of the new ground(s) of rejection.

Communication

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Tu M. Nguyen/

TMN

Tu M. Nguyen

July 7, 2008

Primary Examiner

Art Unit 3748